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(54) Title: PRIORITIZATION OF SUBSCRIBERS IN A SWITCHING CENTER OF A TELECOMMUNICATION SYSTEM
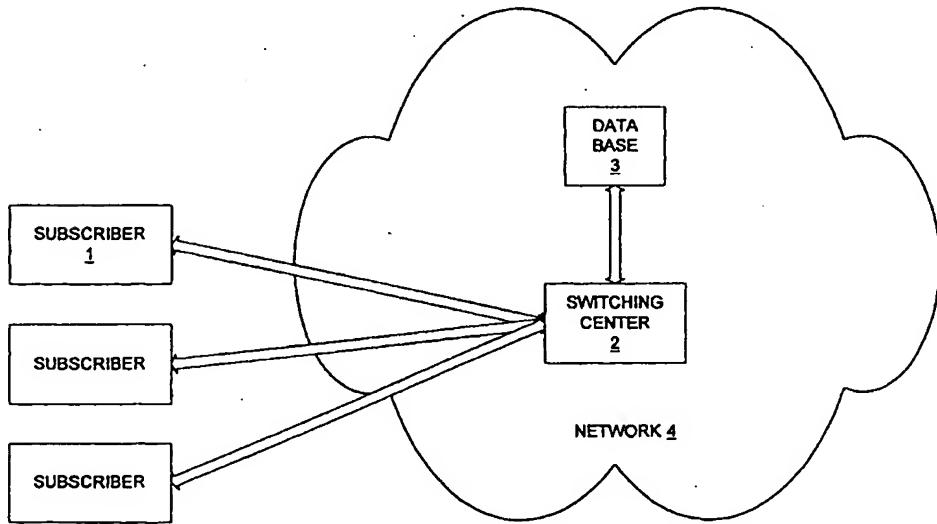
(57) Abstract: A switching method and a network element (2) applying this method are disclosed in which priorities are assigned to subscriber categories, subscriber categories of same priority are combined into a subscriber group and resources are reserved for each subscriber group. When a resource usage request in connection with a subscriber connection request is received from a subscriber (1), the subscriber group is determined to which the subscriber (1) belongs and a resource for the subscriber (1) is allocated out of the reserved resources for this subscriber group.

PRIORITIZATION OF SUBSCRIBERS IN A SWITCHING CENTER OF A TELECOMMUNICATION
SYSTEM

TITLE OF THE INVENTION

Prioritization of subscribers in switching center.

5   FIELD OF THE INVENTION

The present invention relates to a method for switching
subscribers connecting to a switching apparatus providing
services for the connected subscribers.

10

BACKGROUND OF THE INVENTION

In a PLMN (Public Land Mobile Network) like GSM (Global
System for Mobile Communication) subscribers connect to the

15   network through a switching center like MSC (Mobile-
services Switching Center). The switching center acts as an
exchange with some modifications specifically required to
handle the mobile application. The switching center
communicates with a data base like VLR (Visitor Location

20   Register) which stores subscriber data and provides dynamic
subscriber data management.

The switching center and the data base provide mobile
service for the subscribers. Moreover, the switching center

25   provides interworking function for the subscribers which is
needed for speech and non-speech connections to external
networks.

The subscribers connecting to the switching center may be

30   classified according to different categories. For example,
these categories comprise business, normal and telemetric
categories.

When the data base capacity increases so that data of more

35   subscribers are present than subscribers can be handled by

- 2 -

the switching center communicating with the data base, the switching center cannot perform all its functions without overloading.

5   In case of such an overload situation, the service for the subscribers connecting to the overloaded switching center is decreased. For example, when a subscriber of the business category connects to the overloaded switching center this subscriber may not be handled by the switching

10 center anymore, although a subscriber of the telemetric category which has connected to the switching center just before the business subscriber is handled.

SUMMARY OF THE INVENTION

15

It is therefore an object of the present invention to ensure service for subscribers belonging to a certain category. In addition, the service should be provided even in switching center overload situation.

20

This object is achieved by a switching method comprising the steps of:
        assigning priorities to subscriber categories;
        combining subscriber categories of same priority into
25 a subscriber group;
        reserving resources for each subscriber group;
        receiving a resource usage request in connection with
a subscriber connection request from a subscriber;
        determining the subscriber group to which the
30 subscriber belongs; and
        allocating a resource for the subscriber out of the
reserved resources for this subscriber group.

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Moreover, this object is achieved by a network element for providing services for subscribers connecting thereto, the network element applying the above-mentioned method.

5   When the data base capacity (VLR capacity in GSM) is enlarged, switching center overload situations may become more frequent. According to the present invention, users can be prioritized and acceptable service levels for users with high priority can be ensured also in switching center

10   overload situations.

Further features of the present invention are defined in the dependent claims.

15   In the following the present invention will be described by way of a preferred embodiment thereof with reference to the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

20
Fig. 1 shows a schematic block diagram of a system comprising a switching center according to the present invention.

25   Fig. 2 shows a flowchart of an operation of the switching center according to the present invention.

Fig. 3 shows a flowchart of a more detailed operation of the switching center when allocating a resource for a

30   subscriber.

Fig. 4 shows a schematic diagram of a resource allocation of a switching center according to the present invention.

35   DESCRIPTION OF THE PREFERRED EMBODIMENT

Fig. 1 shows a system in which a subscriber 1 like a user
of a mobile station connects to a network 4 through a
switching center 2. As illustrated in Fig. 1, a plurality
5   of subscribers can connect to the switching center 2.

The switching center 2 communicates with a data base 3
which stores data of subscribers connected to the switching
center 2.
10

According to the present invention, the switching center 2
is able to perform ticketing, i.e. allocates resources for
subscribers connecting to the switching center 2 which will
be described in connection with Fig. 2.
15

In advance, the switching center 2 assigns a priority to
each subscriber category used. As it is shown in Fig. 4,
there may be a business category, a normal category and a
telemetric category. According to the preferred embodiment,
20   the switching center 2 gives the business category a high
priority and the normal and telemetric categories a low
priority (step S1 in Fig. 2). Then the switching center 2
groups together the categories having the same priority.
That is, the business category forms a subscriber group
25   having high priority and the normal and telemetric
categories form a subscriber group having low priority
(step S2).

As can be seen from Fig. 4, there is a subscriber queue
30   belonging to the business category having high priority,
and there are subscriber queues belonging to the normal and
telemetric categories having low priority. In other words,
there are two subscriber groups and three subscriber
categories.
35

- 5 -

After that, the switching center 2 reserves resources for
each subscriber group (step S3). The switching center 2 may
for example reserve 60% of its resources for the group with
high priority and the remaining 40% for the group with low
5   priority.

In case the switching center 2 receives a resource usage
request from a subscriber 1 in connection with a subscriber
connection request (step S4), it checks to which category
10 or subscriber group the subscriber 1 belongs (step S5).
After having determined the group, the switching center 2
allocates a resource out of the resources reserved for the
determined subscriber group for the subscriber 1 (step S6).

15 The allocation of resources according to the preferred
embodiment will be described in more detail with reference
to Fig. 3. During a connection request, there can be
several resource usage requests, and the connection setup
fails if any of them fails. Hence, the operation of Fig. 3
20 may be applied several times during a connection setup.

When allocating a resource for the connecting subscriber 1,
the switching center 2 first checks whether a resource for
the determined subscriber group still is available (step
25 S61 in Fig. 3). If YES in step S61, the switching center 2
allocates the resource for the subscriber 1.

When the switching center 2 detects in step S61 that no
resource is available for the determined subscriber group
30 to which the subscriber 1 belongs, or when it detects that
more than a specific amount of resources, for example 95%
of the resources, are in use, the switching center 2 checks
in step S63 whether the determined subscriber group is a
high priority group. If the switching center 2 detects in
35 step S63 that the subscriber 1 belongs to a high priority

group, i.e. the business category group according to the
preferred embodiment, it advances to step S64 in Fig. 3.

In step S64 the switching center checks whether a resource
5   reserved for a subscriber group having low priority is
available. According to the preferred embodiment, the
switching center 2 checks in step S64 whether a resource
reserved for the normal and telemetric categories is
available.
10

If YES in step S64, the switching center 2 allocates a
resource out of the resources reserved for the low priority
group for the subscriber 1 belonging to the high priority
group (step S65).
15

As it is shown in Fig. 4, if the resources for the business
category group subscribers are low, resources may be taken
from the telemetric and normal subscriber group.

20   According to the present invention, subscribers are
classified with respect to their category. To be precise,
priorities are assigned to the different subscriber
categories and categories with the same priority are
grouped together. According to the preferred embodiment of
25   the present invention, there are two groups, a high
priority group comprising the business category and a low
priority group comprising the normal and telemetric
categories.

30   However, the present invention is not restricted to two
groups and there can be one group for each category.
According to Fig. 4, there may be a further dotted line
between the normal and telemetric categories, forming three
subscriber groups. Then, in case resources for the normal
35   category group subscribers are running out, resources can

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be taken from the telemetric subscriber category group.
Furthermore, a top priority group for emergency calls and
the like can be introduced.

5   Furthermore, according to the preferred embodiment, the
resources of the switching center 2 are divided between the
groups. Preferably, the high priority group has the biggest
part of resources reserved.

10 In an overload situation when the resources reserved for
high or higher priority subscribers have run out, some
resources out of the resources reserved for the low or
lower priority groups can be reallocated for the high or
higher priority groups.

15

The resource reservation for each subscriber group can also
be made dynamically during operation. Moreover, priorities
may be assigned dynamically to the subscriber categories
during operation. According to Fig. 4, when the normal
20 subscriber category is given the same priority as the
business subscriber category, the dotted line in Fig. 4
moves down, thus forming a business and normal subscriber
group and a telemetric subscriber group, and it becomes
possible that a normal subscriber gets resources also from
25 the business category if there are extra resources in this
category.

According to the present invention, users can be
prioritized and acceptable service levels for users with
30 high priority can be ensured also in switching center
overload situations.

The present invention is not limited to a specific
switching technology and is also applicable in packet
35 switched networks like IP (Internet Protocol) networks.

Thus, also the term switching is not limited to
conventional switching performed in circuit switched
networks, but it is to be interpreted broadly, i.e.
including also the switching done e.g. in all IP networks,
so that, in some cases, it could also be called routing.

While the invention has been described with reference to a
preferred embodiment, the description is illustrative of
the invention and is not to be construed as limiting the
invention. Various modifications and applications may occur
to those skilled in the art without departing from the true
spirit and scope of the invention as defined by the
appended claims.

CLAIMS:

1. A switching method comprising the steps of:
   assigning (S1) priorities to subscriber categories;
5 combining (S2) subscriber categories of same priority
   into a subscriber group;
   reserving (S3) resources for each subscriber group;
   receiving (S4) a resource usage request in connection
   with a subscriber connection request from a subscriber (1);
10 determining (S5) the subscriber group to which the
   subscriber (1) belongs; and
   allocating (S6) a resource for the subscriber (1) out
   of the reserved resources for this subscriber group.

15 2. The method according to claim 1, wherein a predetermined
   amount of resources is reserved for each subscriber group.

3. The method according to claim 2, wherein the
   predetermined amount of reserved resources for a subscriber
20 group with a high priority is higher than the predetermined
   amount of reserved resources for a subscriber group with a
   low priority.

4. The method according to claim 1, wherein the resources
25 for each subscriber group are reserved dynamically during
   operation.

5. The method according to claim 1, wherein in case that
   reserved resources for a high priority subscriber group
30 reach a specific limit, resources out of reserved resources
   for a low priority subscriber group are allocated for a
   high priority group subscriber.

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6. The method according to claim 1, wherein the priorities are assigned to the subscriber categories dynamically during operation.

5   7. The method according to claim 1, wherein the subscribers are subscribers in a packet switched telecommunication system.

8. A network element (2) for providing services for
10   subscribers (1) connecting to the network element (2) applying the method according to one of claims 1 to 7.

9. The network element according to claim 8, wherein the network element is an element responsible of call control
15   or switching of connections.

10. The network element according to claim 8, wherein the network element is part of a packet switched telecommunication system.
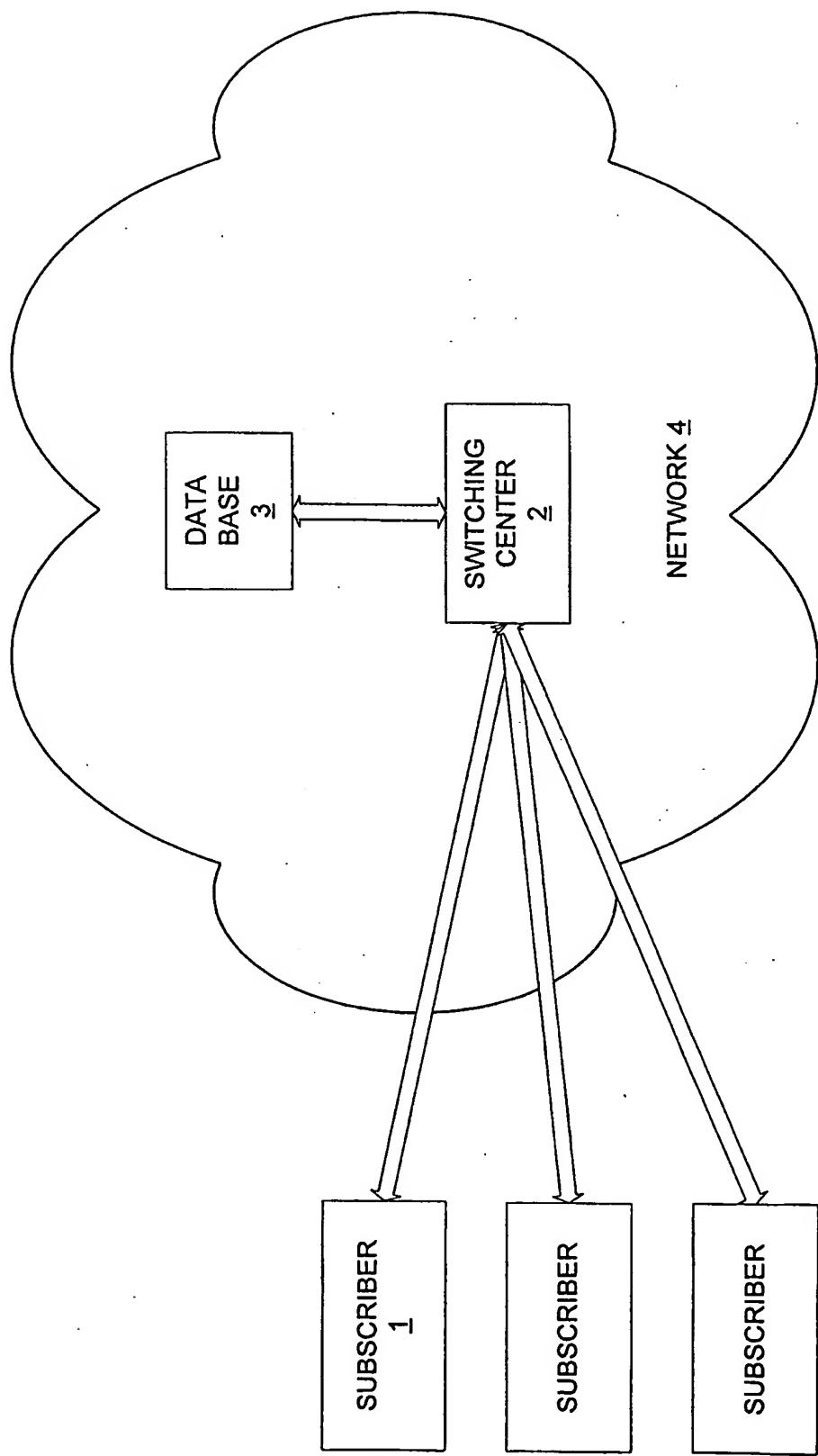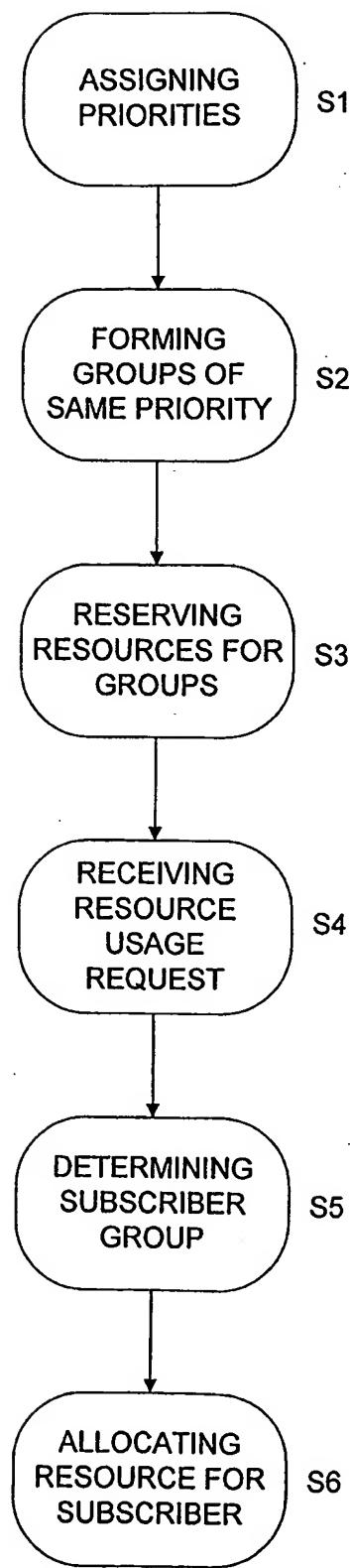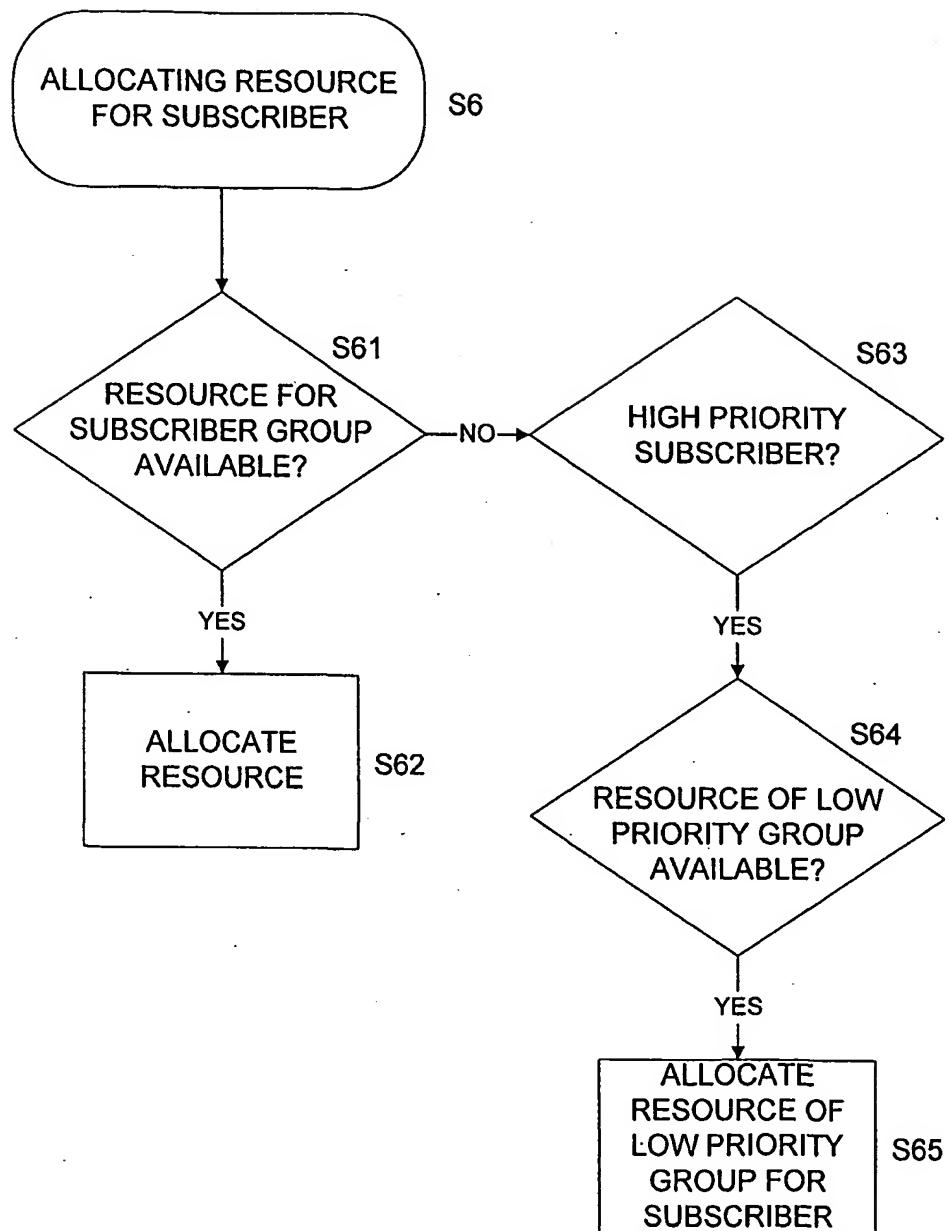
20

FIG. 1

```
        ┌─────────────┐
        │  ASSIGNING  │  S1
        │  PRIORITIES │
        └──────┬──────┘
               │
               ▼
        ┌─────────────┐
        │   FORMING   │
        │  GROUPS OF  │  S2
        │SAME PRIORITY│
        └──────┬──────┘
               │
               ▼
        ┌─────────────┐
        │  RESERVING  │
        │RESOURCES FOR│  S3
        │   GROUPS    │
        └──────┬──────┘
               │
               ▼
        ┌─────────────┐
        │  RECEIVING  │
        │  RESOURCE   │
        │   USAGE     │  S4
        │  REQUEST    │
        └──────┬──────┘
               │
               ▼
        ┌─────────────┐
        │ DETERMINING │
        │ SUBSCRIBER  │  S5
        │   GROUP     │
        └──────┬──────┘
               │
               ▼
        ┌─────────────┐
        │ ALLOCATING  │
        │RESOURCE FOR │  S6
        │ SUBSCRIBER  │
        └─────────────┘
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FIG. 2

FIG. 3
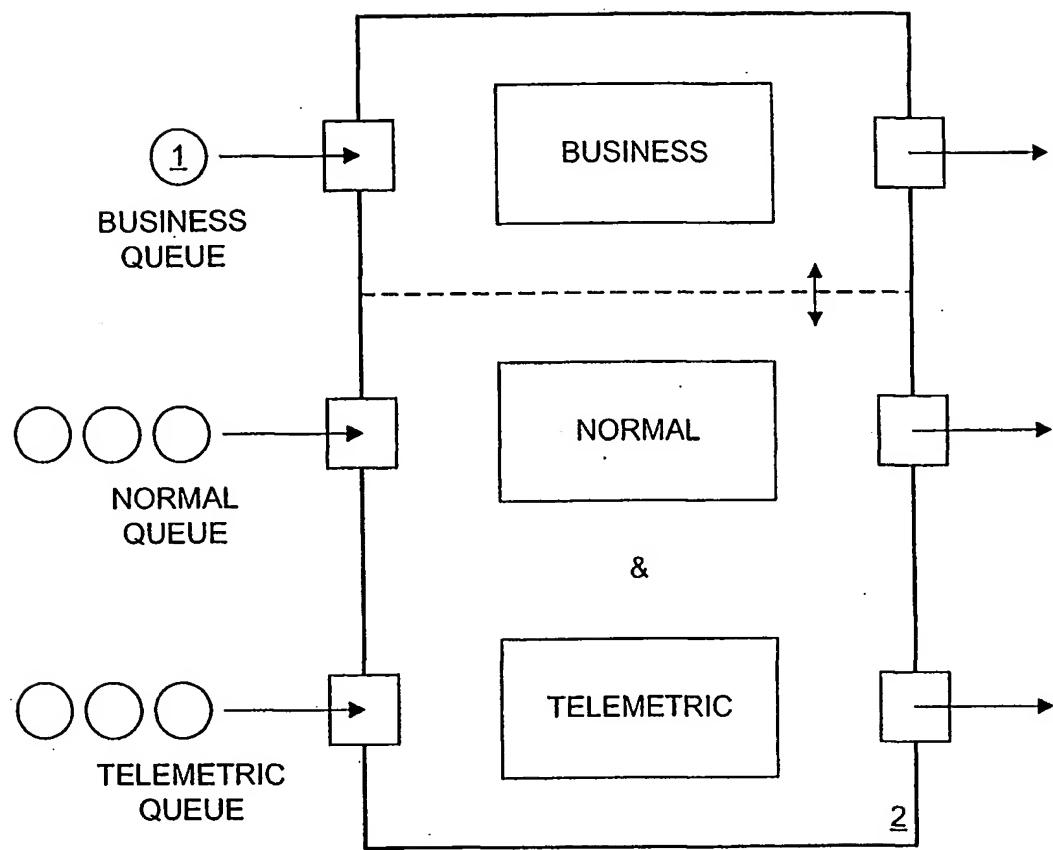
Fig. 4

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7   H04L12/56

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7   H04L   H04Q

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, INSPEC

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0 714 192 A (IBM) 29 May 1996 (1996-05-29) page 15, line 18 -page 17, line 44 ---	1-10
A	EP 0 790 726 A (LUCENT TECHNOLOGIES INC) 20 August 1997 (1997-08-20) page 4, line 15 - line 24 page 6, line 16 - line 41 ---	1-10
A	US 5 574 977 A (HOUDE MICHAEL ET AL) 12 November 1996 (1996-11-12) ------	

☐	Further documents are listed in the continuation of box C.	☒	Patent family members are listed in annex.

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"A" document defining the general state of the art which is not considered to be of particular relevance

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
31 July 2001	06/08/2001

Name and mailing address of the ISA European Patent Office, P.B. 5818 Patentlaan 2 NL – 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Authorized officer Schut, G

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